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ABSTRACT

The document provides statistics related to 1970-80 United States occupational manpower and training needs, with emphasis on the 17-20 year old population. It consists of three tables on: (1) U. S. employment by occupation--1970 and projected 1980 requirements; (2) increase in employment to 1980 and opportunities for 17 and 20 year olds, by percent (rank order) and number of jobs; and (3) training requirements for typical job classifications and related annual course completions for job opportunities available to 17-20 year olds. Also provided is an analysis of the manpower data as related to: job market projections, occupational projections ranked by percentage increase, opportunities related to seven occupational areas, opportunities not covered by the seven occupational areas, and entry requirements and manpower supply. (BP)

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1 June 1974

DEPENDENTS EDUCATION

CAREER EDUCATION GRADES 9-12

USDESEA Pamphlet 352-356-7, dated 1 June 1974, is changed as follows:

* * * * * *

Add Appendix A, United States Occupational Manpower and Training Needs, with Emphasis on the 17-20 Year Old Population.

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Job Market Projections

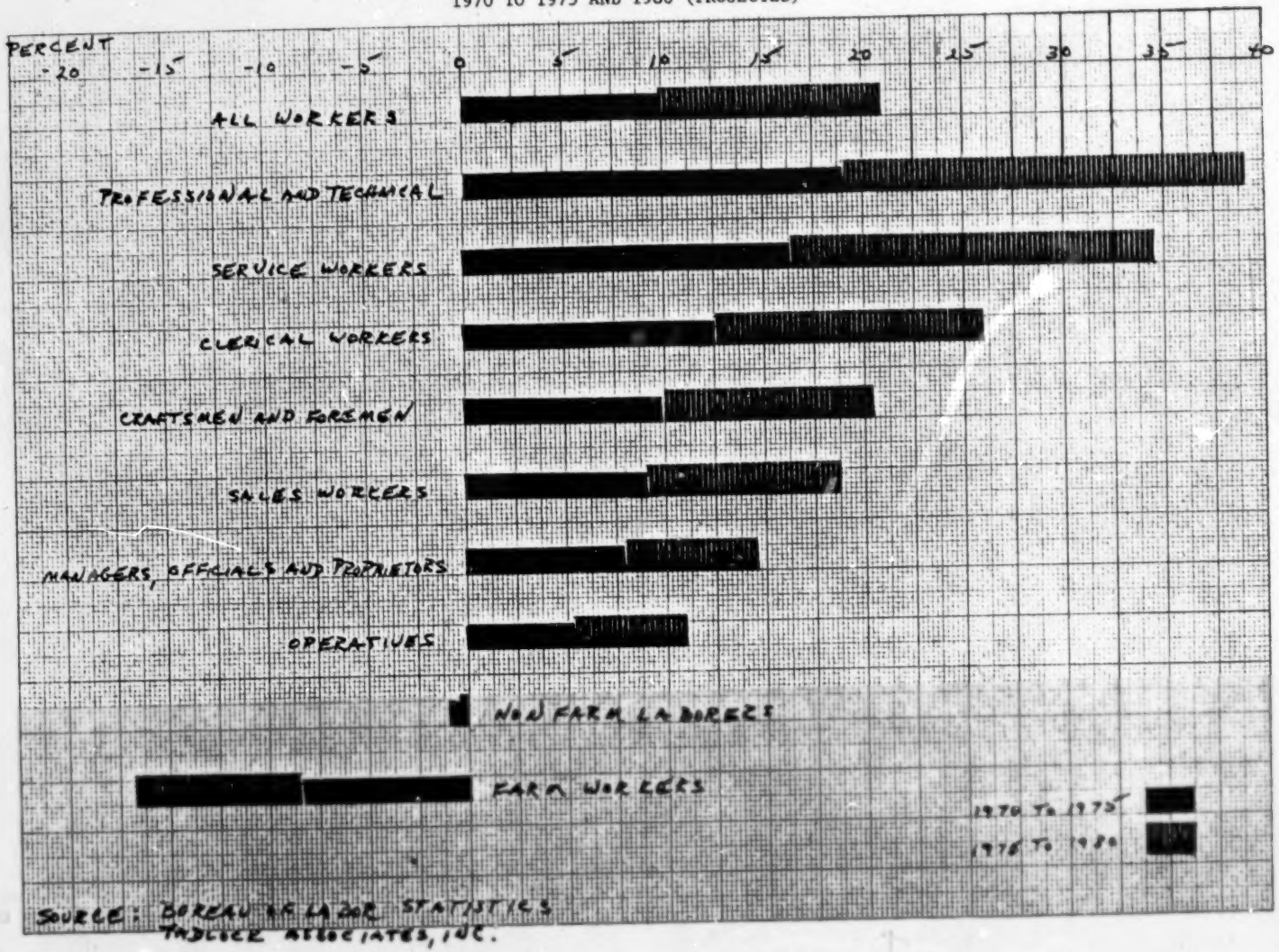
From 1970 levels of employment, projected U.S. occupation requirements show an increase of 7.8 million jobs (9.9 percent) by 1975 and 16.5 million jobs (20.9 percent) by 1980. These expected changes summarized below by occupation category are shown graphically in Chart 1 and in some detail for 1970-1980 in Table 1.

Occupation Category	Change 1970 to 1975		Change 1970 to 1980	
	Jobs (millions)	Percent	Jobs (millions)	Percent
Above average percentage increase:				
Professional and technical	2.1	19.1%	4.4	39.1%
Service workers	1.6	16.3	3.3	34.5
Clerical	1.7	12.3	3.6	26.0
Below average percentage increase:				
Craftsmen and foremen	1.0	9.8	2.1	20.5
Sales workers	0.4	9.0	0.9	18.7
Managers, officials, and proprietors	0.6	7.8	1.2	14.6
Operatives	0.7	5.3	1.5	11.0
Laborers, except farm and mine	--[1]	-1.1	--[2]	- 0.6
Farmers and farm workers	-0.3	-8.4	-0.5	-16.8
Totals	7.8	9.9%	16.5	20.9%

1/ Decrease of 41,000 jobs.

2/ Decrease of 24,000 jobs.

PERCENT CHANGE IN MAJOR OCCUPATIONAL GROUPS
1970 TO 1975 AND 1980 (PROJECTED)



SOURCE: BUREAU OF LABOR STATISTICS
TABLICK ASSOCIATES, INC.

Table 1

U.S. EMPLOYMENT BY OCCUPATION
1970 AND PROJECTED 1980 REQUIREMENTS
(In thousands)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Professional, technical, and kindred workers	11,140.0	15,500.0	4,360.0	39.1%
Engineers, technical	1,081.2	1,498.1	416.9	38.6
Engineers, aeronautical	63.9	77.6	13.7	21.4
Engineers, chemical	50.9	59.3	8.4	11.7
Engineers, civil	179.9	235.6	55.7	31.0
Engineers, electrical	233.8	321.3	87.5	37.4
Engineers, industrial	115.7	187.7	72.0	62.2
Engineers, mechanical	206.7	276.8	70.1	33.9
Engineers, metallurgical	25.5	32.5	7.0	27.5
Engineers, mining	14.6	14.5	- 0.1	- 0.7
Other engineers, technical	190.2	292.8	102.6	53.9
Natural scientists	364.8	504.4	139.6	38.3
Chemists	118.3	166.9	48.6	41.1
Agricultural scientists	39.2	45.9	6.7	17.1
Biological scientists	49.9	70.6	20.7	41.5
Geologists and geophysicists	25.4	29.5	4.1	16.1
Mathematicians	48.6	71.7	23.1	47.5
Physicists	35.9	56.2	20.3	56.5
Other natural scientists	47.5	63.6	16.1	33.9
Technicians, except medical and dental	1,011.7	1,417.1	405.4	40.1
Draftsmen	309.5	435.9	126.4	40.8
Surveyors	51.2	68.2	17.0	33.2
Air traffic controllers	20.0	25.0	5.0	25.0
Radio operators	22.3	31.0	8.7	39.0
Technicians, other	608.7	857.0	248.3	40.8
Medical and other health workers	1,776.4	2,512.2	735.8	41.4
Dentist	96.7	127.6	30.9	32.0
Dietitians and nutritionists	30.0	37.4	7.4	24.7
Nurses, professional	688.7	983.0	294.3	42.7
Optometrists	17.5	21.0	3.5	20.0
Osteopaths	13.5	19.4	5.9	43.7
Pharmacists	128.8	139.8	11.0	8.5
Physicians and surgeons	266.0	395.0	129.0	48.5
Psychologists	33.2	56.0	22.8	68.7
Technicians, medical and dental	263.0	474.0	211.0	80.2
Veterinarians	24.0	33.0	9.0	37.5
Other medical and health workers	215.0	226.0	11.0	5.1

Table 1 (cont'd.)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Teachers	3,072.0	3,382.0	310.0	10.1%
Teachers, elementary	1,260.0	1,249.0	- 11.0	- 0.9
Teachers, secondary	1,015.0	1,081.0	66.0	6.5
Teachers, college	552.0	706.0	154.0	27.9
Teachers, other	245.0	346.0	101.0	41.2
Social scientists	63.2	87.0	23.8	37.7
Economists	25.0	36.0	11.0	44.0
Statisticians and actuaries	29.2	38.0	8.8	30.1
Other social scientists	9.0	13.0	4.0	44.4
Other professional, technical and kindred workers	3,770.7	6,099.2	2,328.5	61.8
Accountants and auditors	491.0	800.0	309.0	62.9
Airplane pilots and navigators	57.0	100.0	43.0	75.4
Architects	33.0	50.0	17.0	51.5
Clergymen	208.0	220.0	12.0	5.8
Designers, except design draftsmen	93.0	135.0	42.0	45.2
Editors and reporters	112.0	126.0	14.0	12.5
Lawyers and judges	286.9	342.0	55.1	19.2
Librarians	125.0	174.8	49.8	39.8
Personnel and labor relations workers	160.0	270.0	110.0	68.8
Photographers	65.0	72.0	7.0	10.8
Social and welfare workers	170.0	253.0	83.0	48.8
Workers and teachers in the arts and entertainment	750.0	909.0	159.0	21.2
Professional, technical, and kindred workers, not elsewhere classified	1,219.8	2,647.4	1,427.6	117.0
Managers, officials, and proprietors	8,289.0	9,500.0	1,211.0	14.6
Conductors, railroad	40.0	39.0	- 1.0	- 2.5
Creditmen	68.0	100.0	32.0	47.1
Officers, pilots, engineers, ship	34.0	32.0	- 2.0	- 5.9
Purchasing agents	167.0	185.0	18.0	10.8
Postmasters and assistants	35.0	35.0	--	--
Managers, officials and proprietors, not elsewhere classified	7,945.0	9,109.0	1,164.0	14.7

Table 1 (cont'd.)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Clerical and kindred workers	13,715.0	17,285.0	3,570.0	26.0%
Stenographers, typists, and secretaries	3,504.0	4,580.0	1,076.0	30.7
Office machine operators	565.0	860.0	295.0	52.2
Other clerical and kindred workers	9,646.0	11,845.0	2,199.0	22.8
Accounting clerks	480.0	530.0	50.0	10.4
Bookkeepers, hand	860.0	970.0	110.0	12.8
Bank tellers	225.0	337.0	112.0	49.8
Cashiers	847.0	1,110.0	263.0	31.1
Mail carriers	254.0	320.0	66.0	26.0
Postal clerks	300.0	385.0	85.0	28.3
Shipping and receiving clerks	379.0	430.0	51.0	13.5
Telephone operators	420.0	480.0	60.0	14.3
Clerical and kindred workers, not elsewhere classified	5,881.0	7,283.0	1,402.0	23.8
Sales workers	4,854.0	5,760.0	906.0	18.7
Craftsmen, foremen and kindred workers	10,158.0	12,240.0	2,082.0	20.5
Construction craftsmen	2,765.0	3,621.0	856.0	31.0
Carpenters	830.0	1,075.0	245.0	29.5
Brickmasons, stonemasons, and tile setters	200.0	260.0	60.0	30.0
Cement and concrete finishers	65.0	90.0	25.0	38.5
Electricians	440.0	585.0	145.0	33.0
Excavating, grading, and road machinery operators	310.0	415.0	105.0	33.9
Painters and paperhangers	390.0	500.0	110.0	28.2
Plasterers	35.0	40.0	5.0	14.3
Plumbers and pipefitters	350.0	470.0	120.0	34.3
Roofers and slaters	60.0	76.0	16.0	26.7
Structural metalworkers	85.0	110.0	25.0	29.4
Foremen, not elsewhere classified	1,488.0	1,700.0	212.0	14.2
Metalworking craftsmen, except mechanics	1,215.0	1,426.6	211.6	17.4
Machinists	585.0	660.0	75.0	12.8
Blacksmiths, forgemen and hammermen	26.0	25.7	- 0.3	- 1.2
Boilermakers	24.0	26.5	2.5	10.4
Heat treaters, annealers, temperers	22.0	24.4	2.4	10.9
Millwrights	80.0	94.0	14.0	17.5

Table 1 (cont'd.)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Molders, metal except coremakers	56.0	62.5	6.5	11.6%
Patternmakers, metal and wood	43.0	56.8	13.8	32.1
Rollers and roll hands	30.0	31.7	1.7	5.7
Sheet metal workers	154.0	195.0	41.0	26.6
Toolmakers, diemakers, setters	195.0	250.0	55.0	28.2
Printing trades craftsmen	312.0	330.3	18.3	5.9
Compositors and typesetters	175.0	165.0	-10.0	- 5.7
Electrotypers and stereotypers	5.0	4.0	- 1.0	-20.0
Engravers, except photo-engravers	13.0	16.3	3.3	25.4
Photoengravers and lithographers	34.0	50.0	16.0	47.1
Pressmen and plate printers	85.0	95.0	10.0	11.8
Transportation and public utility craftsmen	441.1	557.0	115.9	26.3
Linemen and servicemen, telephone and power	380.9	500.0	119.1	31.3
Locomotive engineers	43.0	43.0	--	--
Locomotive firemen	17.2	14.0	- 3.2	- 8.6
Mechanics and repairmen	2,792.0	3,397.9	605.9	21.7
Airplane mechanics and repairmen	140.0	194.0	54.0	38.6
Motor vehicle mechanics	830.0	1,020.0	190.0	22.9
Office machine mechanics	80.0	128.0	48.0	60.0
Radio and television mechanics	132.0	163.0	31.0	23.5
Railroad and car shop mechanics	35.0	32.9	- 2.1	- 6.0
Other mechanics and repairmen	1,575.0	1,860.0	285.0	18.1
Other craftsmen and kindred workers	1,144.9	1,207.2	62.3	5.4
Bakers	101.0	104.0	3.0	3.0
Cabinetmakers	70.0	72.7	2.7	3.9
Cranemen, derrickmen, and hoistmen	145.0	179.0	34.0	23.4
Glaziers	21.0	30.0	9.0	42.9
Jewelers and watchmakers	35.0	34.7	- 0.3	- 0.9
Loom fixers	24.0	21.5	- 2.5	-10.4
Opticians, lens g inders, and polishers	23.0	27.5	4.5	19.6
Inspectors, log and lumber	20.0	23.0	3.0	15.0
Inspectors, other	95.0	75.4	-19.6	-20.6

Table 1 (cont'd.)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Upholsterers	63.0	65.0	2.0	3.2%
Craftsmen and kindred workers, not elsewhere classified	547.9	474.4	26.5	4.8
Operatives and kindred workers	13,909.0	15,440.0	1,531.0	11.0
Drivers and deliverymen	2,510.0	2,900.0	390.0	15.5
Drivers, bus, truck, and tractor	1,855.0	2,150.0	295.0	15.9
Deliverymen, routemen, and cab drivers	655.0	750.0	95.0	14.5
Transportation and public utility operatives	142.0	137.0	- 5.0	- 3.5
Brakemen and switchmen, railroad	88.0	85.0	- 3.0	- 3.4
Power station operators	23.0	25.0	2.0	8.7
Sailors and deck hands	31.0	27.0	- 4.0	-12.9
Semiskilled metalworking occupations	1,892.0	2,239.0	347.0	18.3
Assemblers, metalworking, Class A	136.0	171.0	35.0	25.7
Assemblers, metalworking, Class B	580.0	683.0	103.0	17.8
Inspectors, metalworking, Class B	221.0	252.0	31.0	14.0
Machine tool operators, Class B	310.0	336.0	26.0	8.4
Electroplaters	17.0	19.0	2.0	11.8
Electroplater helpers	25.0	30.0	5.0	20.0
Furnacemen, smeltermen, and pourers	60.0	64.0	4.0	6.7
Heaters, metal	8.0	9.0	1.0	12.5
Welders and flame-cutters	535.0	675.0	140.0	26.2
Semiskilled textile occupations	957.5	1,087.0	129.5	13.5
Knitters, loopers, and toppers	47.5	46.0	- 1.5	- 3.2
Spinners, textile	50.0	41.0	- 9.0	-18.0
Weavers, textile	60.0	50.0	-10.0	-16.7
Sewers and stitchers, manufacturing	800.0	950.0	150.0	18.8
Other operatives and kindred workers	8,407.5	9,077.0	669.5	8.0
Asbestos and insulation workers	25.0	34.0	9.0	36.0

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Table 1 (cont'd.)

Occupation	1970 Employment	Projected 1980 Requirements	Change Number	Change Percent
Attendants, automobile service and parking	430.0	500.0	70.0	16.3%
Blasters and powdermen	5.0	6.0	1.0	20.0
Laundry and dry cleaning operators	360.0	433.0	73.0	20.3
Mine operatives and laborers, not elsewhere classified	195.0	141.0	-54.0	-27.7
Meat cutters, except meat packing	190.0	200.0	10.0	5.3
Operatives and kindred workers, not elsewhere classified	7,202.5	7,763.0	560.5	7.8
Service workers	9,712.0	13,060.0	3,348.0	34.5
Private household workers	1,558.0	1,980.0	422.0	27.1
Protective service workers	968.0	1,300.0	332.0	34.3
Firemen	180.0	275.0	95.0	52.8
Policemen and other law enforcement officials	415.0	600.0	185.0	44.6
Guards, watchmen, and doorkeepers	373.0	425.0	52.0	13.9
Food service workers	2,231.0	2,781.0	550.0	24.7
Bartenders	160.0	200.0	40.0	25.0
Cooks, except private household	740.0	930.0	190.0	25.7
Counter and fountain workers	291.0	411.0	120.0	41.2
Waiters and waitresses	1,040.0	1,240.0	200.0	19.2
Other service workers	4,955.0	6,999.0	2,044.0	41.3
Airline stewards and stewardesses	35.0	65.0	30.0	85.7
Attendants, hospital and other institutions	830.0	1,500.0	670.0	80.7
Charwomen and cleaners	272.0	400.0	128.0	47.1
Janitors and sextons	828.0	1,100.0	272.0	32.9
Nurses, practical	370.0	670.0	300.0	81.1
Other service workers, not elsewhere classified	2,620.0	3,264.0	644.0	24.6
Laborers, except farm and mine	3,724.0	3,700.0	-24.0	- 0.6
Farmers and farm workers	3,126.0	2,600.0	-526.0	-16.8
Total Employment	78,627.0	95,085.0	16,458.0	20.9%

Basis for Projections

The projections of manpower requirements to 1980 are those of the Bureau of Labor Statistics (BLS)[1/] and are based upon a number of assumptions describing the labor force in 1980.

	1970 (million)	1980 (million)
• Labor force	85.9	100.7
• Armed Forces	3.2	2.7
• Civilian labor force	82.7	98.0

The assumed size of the Armed Forces in 1980 is generally consistent with peacetime levels during the late 1950s and early 1960s.

Another important assumption is full employment in 1980. Using a three percent unemployment rate as representative of full employment, civilian employment in 1980 was computed by BLS as follows:

	1970 (million)	1980 (million)
• Civilian labor force	82.7	98.0
• Unemployment	4.1 (4.9%)	2.9 (3.0%)
• Civilian employment	78.6	95.1

Other major assumptions upon which the BLS projections to 1980 are based are:

- The international climate will improve. Although no longer fighting a war, relationships between the major powers will permit no major reductions in armaments from the peak expenditure levels for the Vietnam conflict.
- The institutional framework of the American economy will be relatively unchanged.

1/ Tomorrow's Manpower Needs, Bulletin 1737, Revised 1971.

- Economic, social, technological, and scientific trends will continue, including values placed on work, education, income, and leisure.
- Fiscal and monetary policies will achieve a satisfactory balance between low unemployment rates and relative price stability without reducing the long-term economic growth rate.
- All levels of government will join efforts to meet a wide variety of domestic requirements, but Congress will channel more funds to state and local governments.
- Problems posed by air and water pollution and solid waste disposal may require an increasing amount of the nation's productive resources, but will not dampen significantly our long-run potential rate of growth.

Projections to 1975 have been developed by TAI, using the BLS 1980 projections adjusted for a slower rate of growth (measured by higher unemployment rates since 1970).

Occupation Projections Ranked by Percentage Increase

Table 2 shows the projected change in 143 specific occupational areas. These 143 occupations accounted for 60.4 percent of 1970 employment in the U.S. and are expected to account for 60.6 percent of total U.S. employment projected for 1980. The remaining employment shown is less specific, being designated as "other", i.e., other technical engineers, other natural scientists, etc.

The 143 occupations are ranked in descending order of percentage increase in employment between 1970 and projected employment requirements for 1980. Also, the job market entry opportunities for 17-20 year olds are designated as: 1 (excellent), 2 (good), 3 (some), or 0 (no opportunity because of age and/or educational requirements).

Table 2

INCREASE IN EMPLOYMENT TO 1980 AND OPPORTUNITY FOR 17-20 YEAR OLDS, BY PERCENT (RANK ORDER) AND NUMBER OF JOBS

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Over 75 percent increase in jobs:			
Airline stewards and stewardesses	85.7%	30.0	1
Practical nurses	81.1	300.0	2
Hospital and institutional attendants	80.7	670.0	1
Medical and dental technicians	80.2	211.0	2
Airplane pilots and navigators	75.4	43.0	0
50 to 75 percent increase in jobs:			
Personnel and labor relations workers	68.8	110.0	0
Psychologists	68.7	22.8	0
Accountants and auditors	62.9	309.0	3
Industrial engineers	62.2	72.0	0
Office machine mechanics	60.0	48.0	2
Physicists	56.5	20.3	0
Firemen	52.8	95.0	1
Architects	51.5	17.0	0
Office machine operators	50.0	10.4	1
40 to 50 percent increase in jobs:			
Bank tellers	49.8	112.0	1
Social and welfare workers	48.8	83.0	3
Physicians and surgeons	48.5	129.0	0
Mathematicians	47.5	23.1	0
Charwomen and cleaners	47.1	128.0	1
Credit men	47.1	32.0	3

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

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Table 2 (cont'd.)

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Photoengravers and lithographers	47.1%	16.0	3
Designers (except draftsmen)	45.2	42.0	3
Policemen	44.6	185.0	3
Economists	44.0	11.0	0
Osteopaths	43.7	5.9	0
Glaziers	42.9	9.0	2
Professional nurses	42.7	294.3	0
Biological scientists	41.5	20.7	0
Counter and fountain workers	41.2	120.0	1
Chemists	41.1	48.6	0
Draftsmen	40.8	126.4	1
30 to 40 percent increase in jobs:			
Librarians and aides	39.8	49.8	2
Radio operators	39.0	8.7	1
Airplane mechanics and repairmen	38.6	54.0	3
Cement and concrete finishers	38.5	25.0	2
Veterinarians	37.5	9.0	0
Electrical engineers	37.4	87.5	0
Asbestos and insulation workers	36.0	9.0	3
Cosmetologists	34.3	175.0	1
Plumbers and pipefitters	34.3	120.0	3
Excavating, grading, and road machinery operators	33.9	105.0	3
Mechanical engineers	33.9	70.1	0
Surveyors	33.2	17.0	0

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

Table 2 (cont'd.)

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Electricians	33.0%	145.0	1
Janitors and sextons	32.9	272.0	1
Dentists	32.0	30.9	0
Patternmakers, metal and wood	32.1	13.8	3
Utilities linemen and servicemen	31.3	119.1	2
Cashiers	31.1	263.0	1
Civil engineers	31.0	55.7	0
Stenographers, typists, and secretaries	30.7	1,076.0	1
Statisticians and actuaries	30.1	8.8	0
Brickmasons, stonemasons, and tile setters	30.0	60.0	2
20 to 30 percent increase in jobs:			
Carpenters	29.5	245.0	1
Structural metal workers	29.4	25.0	3
Postal clerks	28.3	85.0	3
Painters and paperhangers	28.2	110.0	2
Toolmakers, diemakers, setters	28.2	55.0	3
College teachers	27.9	154.0	0
Metallurgical engineers	27.5	7.0	0
Private household workers	27.1	422.0	1
Roofers and slaters	26.7	16.0	2
Sheet metal workers	26.6	41.0	2
Welders and flame-cutters	26.2	140.0	2
Mail carriers	26.0	66.0	3
Machine tool operators, Class B	26.0	8.4	2
Cooks	25.7	190.0	1

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

Table 2 (cont'd.)

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Assemblers, metalworking, Class A	25.7%	35.0	2
Engravers, except photoengravers	25.4	3.3	3
Bartenders	25.0	40.0	3
Air traffic controllers	25.0	5.0	0
Dieticians and nutritionists	24.7	7.4	0
Radio and television mechanics	23.5	31.0	1
Cranemen, derrickmen, and hoistmen	23.4	34.0	3
Motor vehicle mechanics	22.9	190.0	1
Aeronautical engineers	21.4	13.7	0
Workers and teachers in the arts and entertainment	21.2	159.0	0
Laundry and dry cleaning operators	20.3	73.0	1
Electroplater helpers	20.0	5.0	3
Optometrists	20.0	3.5	1
Blasters and powdermen	20.0	1.0	3
10 to 20 percent increase in jobs:			
Opticians, lens grinders, and polishers	19.6	4.5	2
Waiters and waitresses	19.2	200.0	1
Lawyers and judges	19.2	55.1	0
Sewers and stitchers, manufacturing	18.8	150.0	2
Sales workers	18.7	906.0	1
Assemblers, metalworking, Class B	17.8	103.0	1
Millwrights	17.5	14.0	2
Agricultural scientists	17.1	6.7	0
Attendants, automobile service and parking	16.3	70.0	1

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

Table 2 (cont'd.)

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Geologists and geophysicists	16.1%	4.1	0
Bus, truck, and tractor drivers	15.9	295.0	2
Log and lumber inspectors	15.0	3.0	3
Deliverymen, routemen, and cab drivers	14.5	95.0	1
Telephone operators	14.3	60.0	1
Plasterers	14.3	5.0	2
Inspectors, metalworking, Class B	14.0	31.0	1
Guards, watchmen, and doorkeepers	13.9	52.0	1
Shipping and receiving clerks	13.5	51.0	1
Bookkeepers, manual	12.8	110.0	1
Machinists	12.8	75.0	3
Editors and reporters	12.5	14.0	3
Metal heaters	12.5	1.0	2
Pressmen and plate printers	11.8	10.0	3
Electroplaters	11.8	2.0	3
Chemical engineers	11.7	8.4	0
Metal molders, except coremen	11.6	6.5	2
Heat treaters, annealers, temperers	10.9	2.4	3
Purchasing agents	10.8	18.0	0
Photographers	10.8	7.0	2
Accounting clerks	10.4	50.0	1
Boilermakers	10.4	2.5	3
Power station operators	8.7	2.0	3
Pharmacists	8.5	11.0	2
Machine tool operators	8.4	26.0	3
Furnacemen, smeltermen, and pourers	6.7	4.0	2

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

Table 2 (cont'd.)

Occupation	Increase In Employment to 1980		Opportunity for 17-20 Year Olds[1/]
	Percent	Jobs (000's)	
Teachers, secondary	6.5%	66.0	0
Clergymen	5.8	12.0	0
Rollers and rollhands	5.7	1.7	3
Meat cutters, except meat packing	5.3	10.0	1
Cabinet makers	3.9	2.7	1
Upholsterers	3.2	2.0	1
Bakers	3.0	3.0	1
Locomotive engineers	0.0	0.0	0
Postmasters and assistants	0.0	0.0	3
Laborers except farm	- 0.6	-24.0	1
Mining engineers	- 0.7	- 0.1	0
Jewelers, watchmakers	- 0.9	- 0.3	1
Teachers, elementary	- 0.9	-11.0	0
Blacksmiths, forgemen, and hammermen	- 1.2	- 0.3	3
Railroad conductors	- 2.5	- 1.0	0
Knitters, loopers, toppers	- 3.2	- 1.5	2
Railroad brakemen and switchmen	- 3.4	- 3.0	0
Compositors and typesetters	- 5.7	-10.0	3
Ship officers, pilots, and engineers	- 5.9	- 2.0	0
Railroad and carshop mechanics	- 6.0	- 2.1	3
Locomotive firemen	- 8.6	- 3.2	0
Loom fixers	-10.5	- 2.5	3
Sailors and deck hands	-12.9	- 4.0	1
Textile weavers	-16.7	-10.0	1
Farmers and farmworkers	-16.8	-526.0	1
Spinners, textiles	-18.0	- 9.0	1
Electrotypers and sterotypers	-20.0	- 1.0	3
Mine operatives and laborers	-27.7	-54.0	1

1/ 1 = excellent
2 = good
3 = some
0 = no opportunity because of age and/or educational requirements

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Opportunities Related to Seven Occupational Areas

The projected growth to 1980 for individual occupations for which there are opportunities for 17-20 year olds have been related to the seven occupational areas under consideration by USDESEA.

	Increase In Employment	
	Percent	Jobs (000's)
• Health occupations		
Practical nurses	81.1%	300.0
Hospital and institutional attendants	80.7	670.0
Medical and dental technicians	80.2	211.0
Total	80.7%	1,181.0
• Computer technology		
Office machine mechanics	60.0%	48.0
Office machine operators	52.2	295.0
Total	53.2%	343.0
• Cosmetology		
Cosmetologists	34.3%	175.0
• Electricity/electronics		
Radio operators	39.0%	8.7
Electricians	33.0	145.0
Utility linemen and servicemen	31.3	119.1
Radio and television mechanics	23.5	31.0
Total	31.2%	303.8
• Business occupations		
Accountants and auditors	62.9%	309.0
Bank tellers	49.8	112.0
Cashiers	31.1	263.0
Stenographers, typists, and secretaries	30.7	1,076.0
Postal clerks	28.3	85.0
Mail carriers	26.0	66.0
Sales workers	18.7	906.0
Telephone operators	14.3	60.0
Shipping and receiving clerks	13.5	51.0
Bookkeepers, manual	12.8	110.0
Accounting clerks	10.4	50.0
Total	24.5%	3,088.0

	Increase In Employment	
	Percent	Jobs (000's)
• Graphic communication		
Photoengravers and lithographers	47.1%	16.0
Designers (except draftsmen)	45.2	42.0
Draftsmen	40.8	126.4
Engravers (except photoengravers)	25.4	3.3
Editors and reporters	12.5	14.0
Pressmen and plate printers	11.8	10.0
Photographers	10.8	7.0
Compositors and typesetters	- 5.7	-10.0
Electrotypers and Stereotypers	-20.0	- 1.0
Total	23.3%	207.7
• Automotive technology		
Airplane mechanics and repairmen	38.6%	54.0
Motor vehicle mechanics	22.9	190.0
Attendants, automobile service, and parking	16.3	70.0
Bus, truck, and tractor drivers	15.9	295.0
Deliverymen, routemen, and cab drivers	14.5	95.0
Total	18.0%	705.0
Grand Total, Seven Area	28.6	6,002.5

The seven occupational areas in the broad sense cover 35 of the 143 individual occupations for which BLS reports information. These 35 occupations accounted for 21.0 million jobs in 1970 (26.7 percent of total employment), 27.0 million jobs in 1980 (28.4 percent of total employment), an increase of 6.0 million jobs between 1970 and 1980, which represents a 28.6 percent increase. The increase in jobs for the 35 occupations represent 36.5 percent of the total increase projected for employment by 1980.

Summarizing the seven occupational areas, the increase in jobs projected to 1980 is as follows:

Occupational Area	Increase In Employment to 1980 Jobs (000's)	Percent
Health occupations	1,181.0	80.7%
Computer technology	343.0	53.2
Cosmetology	175.0	34.3
Electricity/electronics	303.8	31.2
Business occupations	3,088.0	24.5
Graphic communication	207.7	23.3
Automotive technology	704.0	18.0
Total--Seven Areas	6,002.5	28.6%
Average--All Occupations Table 1		20.9%

Although the seven occupational areas are projected to show an above average increase in jobs (28.6 percent versus 20.9 percent for all occupations) by 1980, there is considerable range in the increase by individual occupational areas--from a high of 80.7 percent increase in health occupations to a low of 18.0 percent for automotive-related occupations. Also, when the five printing trades (included in graphic communication) are considered separately, their projected increase to 1980 is low--18,300 jobs (5.9 percent). (See Table 1.)

Two occupational areas account for 71.7 percent of the 6.0 million increase in jobs projected by 1980 in the seven occupational areas--business occupations (3.1 million jobs) and health occupations (1.2 million jobs). On the other hand are cosmetology (175,000 jobs) and graphic communication (207,700 jobs), which comprise 6.4 percent.

Opportunities Not Covered by the Seven Occupational Areas

It should be pointed out that there are a number of occupational areas having above average growth with excellent opportunities for the 17 to 20-year olds that are not covered by the seven occupational areas under consideration by USDESEA. These include food service, protective

service, construction, and to a lesser extent, semiskilled metalworking. These occupations and their projected growth to 1980 are summarized below.

Occupational Area	Increase In Employment to 1980 Jobs (000's)	Percent
Food service		
Counter and fountain workers	120.0	41.2%
Cooks, except private households	190.0	25.7
Bartenders	40.0	25.0
Waiters and waitresses	200.0	19.2
Total	550.0	24.7%
Protective service		
Firemen	95.0	52.8 %
Policemen and other law enforcement officials	185.0	44.6
Guards, watchmen, and doorkeepers	52.0	13.9
Total	332.0	34.3%
Construction		
Cement and concrete finishers	25.0	38.5%
Plumbers and pipefitters	120.0	34.3
Excavating, grading, and road machinery operators	105.0	33.9
Electricians	145.0	33.0
Brickmasons, stonemasons, and tile setters	60.0	30.0
Carpenters	245.0	29.5
Structural metalworkers	25.0	29.4
Painters and paperhangers	110.0	28.2
Roofers and slaters	16.0	26.7
Plasterers	5.0	14.3
Total	856.0	31.0%
Semiskilled metalworking		
Welders and flame cutters	140.0	26.2%
Assemblers, metalworking, Class A	35.0	25.7
Electroplater helpers	5.0	20.0
Assemblers, metalworking, Class B	103.0	17.8
Inspectors, metalworking, Class B	31.0	14.0
Metal heaters	1.0	12.5
Electroplaters	2.0	11.8
Machine tool operators, Class B	26.0	8.4
Furnacemen, smeltermen, and pourers	4.0	6.7
Total	347.0	18.3%

Entry Requirements and Manpower Supply

Table 3 describes the training and other requirements for 147 occupations for which there are opportunities for 17 to 20-year olds. These opportunities range from "excellent" to "some". Each listing of occupational training requirements is followed by annual openings for growth and replacement during the period 1970 to 1980 and known data on the number of persons completing training. Available training completion data reflect the following time periods:

College graduates--academic year 1968-69
Junior college graduates--academic year 1968-69
Vocational education completions--fiscal year 1969
MDTA enrollments--fiscal year 1969
Apprenticeship completions--calendar year 1969.

Jobs in the crafts area have entry constraints that vary from community to community inasmuch as the apprenticeship programs are operated by the unions and because of local labor market demands.

Table 3

TRAINING REQUIREMENTS FOR TYPICAL JOB CLASSIFICATIONS
AND RELATED ANNUAL COURSE COMPLETIONS FOR
JOB OPPORTUNITIES AVAILABLE TO 17-20 YEAR OLDS

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1/]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Professional and Related											
Accountants	Junior college, business school, or correspondence course is acceptable for some jobs	14,000	19,000	33,000	21,405	4,741					
Advertising	Usually requires college degree										
Forestry Aides	Work experience or one- or two-year post-high school. Time is spent in forest or camp operated by school	300	600	900		596					
Health Service											
Dental Hygienists	Graduation from an accredited dental hygiene school; licensing examination in state of practice	900	1,500	2,400		1,456		929			
Dental Lab Technicians	On-the-job training, three to four years; course work available	1,200	900	2,100		364	96	246			
Practical Nurses	Usually requires completion of state board approved course and passing licensing examination	25,000	23,000	48,000		5,564	2,192	19,586			
Occupational Therapist	Certificate in occupational therapy	500	1,000	1,500	609						
Medical Record Librarians	One year of specialized training after two or more years of college	700	700	1,400				118 (AMA approved programs)			
Physical Therapist	Certificate in physical therapy	1,000	1,600	2,800	1,112						
Medical Lab Workers (Technologists, Technicians, Assistants)	For technicians, one or more years of post-secondary training in junior college or vocational school	5,300	7,500	12,800		772	600	1,058			
Radiologic Technologists	Training programs usually 24 months	3,500	3,800	7,300		570	93	442			
Other Health Service (Hospital Attendants, etc.)						1,996	3,023	3,618	2,600	18,600	

1/ Based upon available data for: College graduates--academic year 1968-69; junior college graduates--academic year 1968-69; MDTA enrollments--fiscal year 1969; vocational education completions--fiscal year 1969; apprenticeship completions--calendar 1969.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Engineering and Science											
Technicians	Most programs are two years post-high school. Some training on-the-job. Such occupations as tool designer and electronics technician through apprenticeship	9,000	22,000	31,000		30,018	12,332	30,149			
Draftsmen	Post-high school technical training usually required. Also on-the-job training with part-time schooling or three or four-year apprenticeship programs available	3,500	11,800	15,300			12,853	3,099			
Air Transport											
Airline Dispatchers	Dispatchers require FAA certificate: one year in dispatching; completion of FAA approved course; two years as air-traffic controller, dispatch clerk, assistant dispatcher, or radio operator. Assistant dispatchers required to have two years of college or equivalent time in air transportation	25	25	50							
Air Traffic Controllers	Requires certificate (nine weeks of training) and two or three years at FAA control tower/center	200	225	425							
Flight Engineers	FAA certificate after two years of training or three years of work experience	100	125	225							
Pilots and Co-pilots	Pilots licensed by FAA, Co-pilots and most pilots in general aviation must have a "commercial airplane pilot" license. An "instrument rating" is often required. Applicants for either must be at least 18 and have 200 hours of flight experience	700	1,100	1,800				791			

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

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Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Other Professional											
Broadcast Technicians	Requires radiotelephone first class operator license. Written tests. Technical school training useful	150	250	400							
Commercial Artists	Two or three years study at an art school or institute usually required	1,400	500	1,900							
Ground Radio Operators and Teletypists	A third-class operator's permit is acceptable but a second-class permit is preferable. Qualifications include a high school education, a good speaking voice, ability to type at least 40 wpm, and a knowledge of standard codes and communications symbols	225	125	100							
Models	No formal education required but training in a modeling school helps	1,000	700	1,700							
Photographers	On the job, apprenticeship programs and two-year courses	1,300	900	2,200							
Radio and TV Announcers	Some training in high school and vocational schools	400	200	600							
Surveyors	Post-high school courses and on-the-job training. Some states require experience and examination	700	1,900	2,600							
Clerical											
Bank Clerks	High school education preferred	20,000	9,500	29,500							
Bank Tellers	High school education preferred	12,000	8,000	20,000							
Bookkeepers	High school education	58,000	20,000	78,000							
Cashiers	High school education	38,000	31,000	69,000							
Railroad Clerks	High school education	3,100	-400	2,700							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education: Secondary	Vocational Education: Post-Secondary	MDTA: On-the-Job	MDTA: Institutional	Apprenticeship
Dental Assistants	On-the-job training and formal post-high school programs	4,600	4,400	9,000		1,307	1,201	1,952			
Computer Operators	Usually requires at least high school education	1,600	18,800	20,400		4,633					
Hotel Front Office Clerks	At least high school education	1,950	1,250	3,200							
Library Technicians	High school education	4,500	4,500	9,000		134					
Mail Carriers	Civil Service and physical examination	4,800	7,400	12,200							
Office Machine Operators	Graduation from high school or business school	15,000	10,000	25,000							
Postal Clerks	Civil Service and physical examination	6,700	7,900	14,600							
Receptionists	High school education	17,000	13,000	30,000							
Shipping and Receiving Clerks	High school education preferred	7,600	7,800	15,400					1,500		
Station Agents	Experienced telegraphers	250	-475	-225							
Stenographers and Secretaries	High school education	155,000	82,000	237,000			126,782	15,373		6,480	
Telegraphers, Telephoners and Towermen (Railroad)	High school education preferred	150	- 50	100							
Telephone Operators	High school education preferred	21,100	6,900	28,000							
Traffic Agents and Clerks (Civil Aviation)	Generally require high school education	1,100	1,500	2,600							
Typists	High school education preferred	42,000	21,000	63,000			80,472	7,592			

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]					
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Sales											
Insurance Agents and Brokers	Must be licensed by state. Most states have examination. College degree helpful	10,400	5,800	16,200							
Manufacturers' Salesmen	College training increasingly preferred	12,500	19,500	32,000							
Real Estate Salesmen and Brokers	High school education preferred	10,400	3,800	14,200							
Retail Sales Clerks	High school education preferred	95,000	55,000	150,000							
Automobile Parts Countermen	High school education preferred	1,250	1,250	2,500							
Automobile Salesmen	High school education preferred. Some employers have minimum age requirement	4,400	2,100	2,300							
Automobile Service Managers	Beginning service managers trained on-the-job	100	200	300							
Securities Salesmen	Most states require license--personal bond or written examination. Increasingly a college degree is required	4,600	2,800	7,400							
Wholesale Trade	High school education preferred	12,000	13,200	25,200							
Service											
Barbers	Completion of 8th grade and graduation from state approved barber school. Most states require examination for apprentice license	8,600	4,200	12,800			139	553			
Bellmen and Bell Captains (Hotel)	No requirements	800	300	1,100							
Building Custodians	No requirements	50,000	30,000	80,000							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Cooks and Chefs	On-the-job training usually	29,000	19,000	48,000			1,563	423	1,800	3,600	
Cosmetologists	Usually 8th grade and licensing by state	21,000	17,000	38,000			7,126	2,476			
Firemen	High school education and examination	2,500	5,200	7,700			34	823			
Hospital Attendants	High school education preferred	42,000	58,000	100,000			7,270	3,939			
Housekeepers and Assistants	High school education preferred	1,800	600	2,400							
Police Officers (Municipal)	Minimum of high school education preferred	8,500	6,500	15,000		2,851	168	4,846			
(State)	Usually requires high school education and training program	1,100	1,700	2,800							
Practical Nurses	Minimum of two years high school and licensing by examination	25,000	23,000	48,000		5,564	2,192	19,586			
Private Household Workers	No requirements	100,000	21,000	121,000							
Stewardesses and Stewards	High school education and training by airlines or private stewardesses' and stewards' schools	N.A.	3,300	N.A.							
Waiters and Waitresses	Usually on-the-job training	44,000	23,000	67,000			663	110			
Construction Trades											
Asbestos and Insulating Workers	Four-year apprenticeship	300	500	800							
Bricklayers	High school education preferred and three-year apprenticeship desirable	3,400	5,000	8,400			4,032	272			1,651
Carpenters	High school education preferred and four-year apprenticeship with classroom instruction recommended	22,100	17,200	39,300			7,472	1,080	3,700	500	
Cement Masons	Some high school preferred. Three-year apprenticeship with classroom instruction recommended	1,100	2,500	3,600							300

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Electricians	High school education required. Four-year apprenticeship program with classroom instruction recommended	3,800	6,700	10,500							5,091
Elevator Constructors	Usually requires two years of on-the-job training including six months at the factory	200	300	500							217
Floor Covering Installers	High school education preferred. Three- to four-year apprenticeship with classroom instruction recommended	900	800	1,700							145
Glaziers	High school education required. Three-year apprenticeship recommended	150	350	500							829
Lathers	High school education encouraged. Two-year apprenticeship recommended	650	650	1,250			103	299	800		
Operating Engineers	High school education or equivalent required. Three-year apprenticeship program recommended	4,400	10,400	14,800			405	33			829
Painters and Paperhangers	High school education preferred. Three-year apprenticeship with classroom instruction recommended	11,500	6,700	18,200			11	26			228
Plasterers	Three- to four-year apprenticeship with classroom instruction recommended	700	0	700			725	162			4,888
Plumbers and Pipefitters	Five-year apprenticeship with classroom instruction recommended. Some localities require passing of licensing examination	7,400	12,100	19,500							266[2]
Roofers	High school education or equivalent desirable. Three-year apprenticeship with classroom instruction recommended	900	2,100	3,000							

1/ Ibid.
2/ Annual average 1961-68.
Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

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Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Sheet Metal Workers	High school education or equivalent required for entry into apprenticeship programs. Four-year apprenticeship program with classroom instruction recommended	800	1,700	2,500			1,388	254			2,544
Stonemasons, Marble Setters, Tilesetters, and Terazzo Workers	High school education or equivalent desirable. Three-year apprenticeship with classroom instruction recommended	500	350	850							
Structural, Ornamental, and Reinforcing Iron Workers, Riggers and Machine Movers	High school education or equivalent desirable. Three-year apprenticeship with classroom instruction recommended	1,400	2,500	3,900							
All-round Machinists	High school or trade school education helpful. Four-year apprenticeship with classroom instruction recommended	8,400	4,200	12,600					1,900	1,800	3,527
Instrument Makers	High school education preferred. Four-year apprenticeship with classroom instruction recommended	(included in all-round machinists)									
Tool and Die Makers	High school or trade school education preferred. Four to five-year apprenticeship or time on the job	2,900	800	3,700							4,125
Mechanics and Repairmen											
Air-conditioning, Refrigeration, and Heating Mechanics	High school education preferred. On-the-job training	1,700	3,300	5,000							
Aircraft Mechanics	High school or trade school education preferred. Training by FAA approved schools (18 to 24 months), airline schools (3 to 4 years), or 2-year college programs	1,800	7,900	9,700							
Appliance Servicemen	Usually hired as helpers and acquire skills on the job. Also, correspondence courses and technical schools available	4,000	4,600	8,600							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions 1/					
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Automobile Body Repairmen	Three- to four-year apprenticeship with classroom instruction recommended	1,400	2,100	3,500			4,164	1,586	2,000	3,900	211
Automobile Mechanics	Three- to four-year apprenticeship recommended	8,750	11,300	20,050					2,200	9,700	1,017
Bowling-pin Machine Mechanics	Schools maintained by manufacturers	100	- 50	50							
Business Machine Servicemen	High school education preferred. Instruction in manufacturer's or dealer's schools plus on-the-job training	1,400	7,100	8,500			379	119			
Electric Sign Servicemen	High school education preferred. Usually three years on-the-job training required	100	200	300							
Farm Equipment Mechanics	Usually three years on-the-job training required	700	400	1,100							
Industrial Machinery Repairmen	On-the-job training or four-year apprenticeship with classroom instruction	3,800	3,750	7,500							
Instrument Repairmen	Usually high school education. On-the-job training or up to four years apprenticeship with classroom instruction	1,700	2,900	4,600			232	211			
Maintenance Electricians	On-the-job training or up to four years apprenticeship with classroom instruction. A number of municipalities require an examination and licensing	4,500	5,400	9,900							
Millwrights	On-the-job training or up to four years apprenticeship with classroom instruction. High school education preferred for apprentices	1,500	900	2,400							
TV and Radio Service Technicians	Two or three years combined training by technical, vocational, or high schools and on-the-job experience	1,300	1,700	3,000							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

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Table 5 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Truck and Bus Mechanics	High school education preferred. On-the-job training or up to four years apprenticeship with classroom instruction	1,500	1,400	2,900							
Vending Machine Mechanics	Training by on-the-job (6 months to 2 years) or by attending manufacturer-sponsored training sessions	300	350	650							
Watch Repairmen	Training by private watch repair schools, vocational high school, apprenticeship, and on the job	600	800	1,400							
Printing (Graphic Arts)											
Bookbinders	High school education preferred. Four- or five-year apprenticeship combining on-the-job training and classroom instruction	800	-400	400							315
Composing Room	High school education preferred. Six-year apprenticeship with classroom instruction or correspondence courses	4,000	-800	3,200							837
Electrotypers and Stereotypers	High school education preferred. Five- or six-year apprenticeship combining on-the-job training and classes	150	-175	- 25							
Lithographers	High school education preferred. Four- or five-year apprenticeship	1,200	600	1,800							785
Photoengravers	High school education. Five-year apprenticeship with classroom instruction	300	0	300							54
Printing Pressmen and Assistants	High school education preferred. Two- to five-year apprenticeship combining on-the-job training and classroom or correspondence school	1,600	1,250	2,850							826

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Telephone Industry											
Central Office Craftsmen	High school or vocational school education	1,700	1,000	2,700							
Equipment Installers	High school or vocational school education	400	0	400							
Linemen and Cable Splicers	High school or vocational school education	400	200	600							
Telephone and PBX Installers and Repairmen	High school or vocational school education	1,800	1,200	3,000							
Other Crafts											
Automobile Upholsterers	High school education desirable. Usually on-the-job training	175	175	350							
Blacksmiths	On-the-job training or three or four years of apprenticeship	600	-100	500							
Boilermakers	High school education preferred. Four-year apprenticeship recommended	600	400	1,000							
Dispensing Opticians and Optical Mechanics	On-the-job training. Apprenticeship recommended	400	100	500							
Furniture Upholsterers	On-the-job training	700	100	800							
Jewelers and Jewelry Repairmen	On-the-job training or three- to four-year apprenticeship	200	0	200							
Locomotive Firemen	High school education preferred	200	-400	-200							
Motion Picture Projectionists	High school education preferred. Apprenticeship required in a union theatre	600	150	750							
Railroad Shop Trades	Usually apprenticeship training	2,400	-150	2,250							
Shoe Repairmen	On-the-job training	1,500	0	1,500			248	26			
Stationary Engineers	High school education preferred. Apprenticeship training recommended	5,800	1,250	7,050							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

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Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Operatives											
Assemblers	High school or vocational school education preferred. On-the-job training	20,500	5,500	26,000							
Automobile Painters	High school education preferred. On-the-job training or three-year apprenticeship	600	600	1,200							
Electroplaters	On-the-job training or three- or four year apprenticeship	400	200	600							
Gasoline and Service Station Attendants	High school education preferred. On-the-job training	4,700	6,200	10,900							
Inspectors (Manufacturing)	High school education preferred. On-the-job training	15,000	4,200	19,200							
Machine Tool Operators	On-the-job training	8,800	1,700	10,500							
Meat Cutters	On-the-job training or two- to three-year apprenticeship	4,100	400	4,500			630	107		630	
Photographic Lab Workers	On-the-job training	850	750	1,600			711	666			
Power Truck Operators	On-the-job training	2,600	1,500	4,100							
Production Painters	On-the-job training	2,900	1,100	4,000							
Railroad Brakemen	High school education preferred. On-the-job training	1,300	-300	1,000							
Railroad Bridge and Building Workers	On-the-job training	300	- 25	275							
Railroad Signalmen	High school education preferred. On-the-job training	100	-550	-450							
Railroad Track Workers	Usually on-the-job training	1,500	-200	1,300							
Routemen	High school education preferred. Most states require chauffeur's license	2,800	1,000	3,800							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.

Table 3 (cont'd.)

Occupation	Training and Other Requirements	Manpower Needs Annual Openings, 1970-1980			Annual Course Completions[1/]						
		Replacement	Growth	Total	Baccalaureate and Higher	Junior College	Vocational Education Secondary	Vocational Education Post-Secondary	MDTA On-the-Job	MDTA Institutional	Apprenticeship
Stationary Firemen (Boiler)	Usually requires an examination. Some cities and states require licensing	700	-1,300	-600							
Taxi Drivers	Chauffeur's license and special local operator's license	1,900	-700	1,200							
Truck Drivers, Local	Some high school education preferred. On-the-job training	15,500	21,500	37,000							
Truck Drivers, Over-the-Road	One year of driving experience and chauffeur's license	13,200	8,400	21,600							
Welders, Oxygen and Arc Cutters	High school or vocational school education preferred. On-the-job training	7,000	16,000	23,000			6,596	4,254	1,700	8,800	
Laborers (Non-farm)											
Construction Laborers	On-the-job training	14,000	15,000	29,000							
All Other	On-the-job training	50,000	-19,000	31,000							

1/ Ibid.

Source: Bureau of Labor Statistics; Tadlock Associates Inc. compilations.